

Piezoelectric Structural Microsensor Technology for Extreme Environments (> 1800 F), Phase II

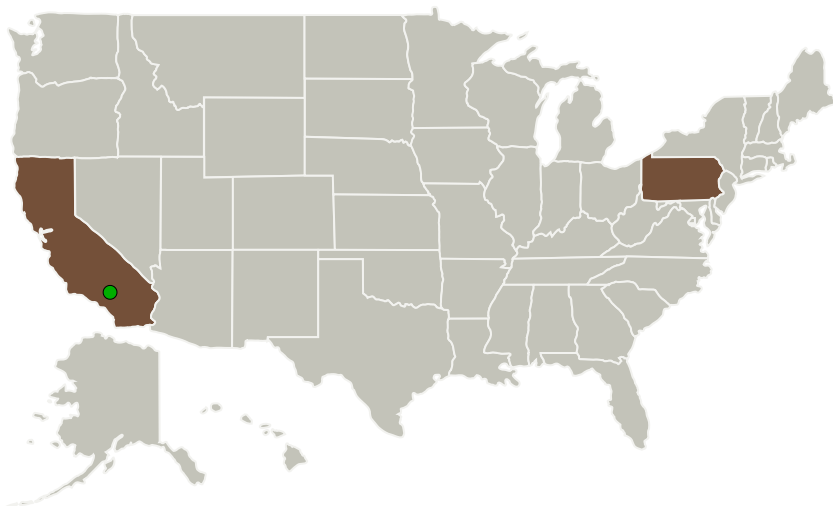
Completed Technology Project (2010 - 2013)



Project Introduction

High temperature piezoelectric crystal (HTPC) sensors are desired for future propulsion component structure health monitoring, operating parameters optimization, turbine engine control and health monitoring, as well as improving performance and maintainability of power production facilities and other rotary combustion engines. Recently discovered high temperature piezoelectrics showed stable piezoelectric properties and high resistivity at temperatures close to its melting point (~ 1500 C), which is very promising for high temperature sensor applications. The Phase I results demonstrated excellent temperature sensing and vibration sensing performance at temperature up to 1000 C (> 1800 F). In Phase II, low profile HTPC microsensors design, fabrication and attachment will be further investigated and optimized. Highly sensitive HTPC piezoelectric structural microsensors will be prototyped and characterized for temperature, stress and acceleration measurements at temperatures up to 2000 oF. HTPC microsensor reliability will also be studied in Phase II. HTPC microsensors will significantly advance NASA, DOD and industrial high temperature measurements because of their low profile, simple structure, high sensitivity, quick response, and high reliability.

Primary U.S. Work Locations and Key Partners



Piezoelectric Structural Microsensor Technology for Extreme Environments (> 1800 F), Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Piezoelectric Structural Microensor Technology for Extreme Environments (> 1800 F), Phase II

Completed Technology Project (2010 - 2013)



Organizations Performing Work	Role	Type	Location
TRS Ceramics, Inc.	Lead Organization	Industry	State College, Pennsylvania
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Pennsylvania

Project Transitions

▶ **March 2010:** Project Start

✓ **March 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139335>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TRS Ceramics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

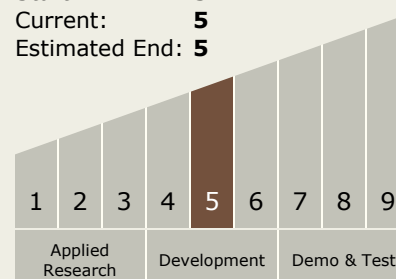
Carlos Torrez

Principal Investigator:

Xiaoning Jiang

Technology Maturity (TRL)

Start: 5
Current: 5
Estimated End: 5



Piezoelectric Structural Microensor Technology for Extreme Environments (> 1800 F), Phase II

Completed Technology Project (2010 - 2013)



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.6 Extreme Environments Related to Critical System Health Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System